My "Take" on the Nikon D90

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Introduction

Nikon's ads for the D90 say "... the new Nikon D90 is everything you need." That's not much of an exaggeration. It's everything a serious amateur still photographer needs. Arguably it could supplant a D300 for many, if not a majority, of potential users; certainly it supplants my D200, which now serves as my backup to the D90. From my perspective[1], it is a better camera than the D300, for reasons I will give below.

I bought my D90 in mid-November 2008, a little more than two months before writing this review. I've put the D90 through its paces in my standard testing, in several photo outings and short out-of-town trips, and in a low-light volunteer assignment to photograph a three-hour dress rehearsal of a small orchestra in an Ottawa church. I've tested it head-to-head against my D200 and a D300 that I rented for a weekend; you will find these results, with sample photographs, at the end of this review.

My review is divided into three large sections:

> my recommendations for the D90 menu settings to use, different from Nikon's recommended defaults;
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> comments of specific D90 features that particularly interest me; and
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> comparisons with two other Nikon SLRs - the D200 and the D300.

I have illustrated some of my comparisons with test photos that I've taken.

My Recommended D90 Menu Settings

Nikon provides a wide number of menu options in its Setup, Custom and Shooting menus - total of 69, to be exact. That's a large number of choices to make. This section of my review in intended to help readers who are overwhelmed by the menu options. If you are comfortable with making your own choices and think you understand all the options that Nikon provides you, skip to the next section on specific D90 features. If you are reading this review partly to decide whether to buy one, you might want to skip this section, as it isn't going to make much sense to you without the camera or user manual in front of you. (By the way, Nikon provides free PDF downloads of all its camera models on its websites; if you are curious about the features of a camera that you haven't bought yet, the user-manual download will give you much more information about a particular camera model than you're likely to find in any review, no matter who wrote it.)

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[1] My perspective is that of an owner of a string of Pentax SLR film cameras from 1965-1993, a string of Nikon SLR film cameras from 1992-2004, several Nikon Coolpix models from 1999-2004, and Nikon digital SLRs (the D100, D70, D200 and most recently D90) since 2003.

Nikon provides default settings on most of the 69 options. I agree with Nikon on 48 of them, but I changed 21 of them. I discuss below what I changed, giving my reasons for changing them. You're welcome to disagree with me on these. Assume that I agree with the Nikon default (the one the camera has when you first turn it on), for any setting that I don't mention below.

Setup Menu

The D90 has a "clean image sensor" feature, which vibrates the low-pass filter to shake dust off it. I set this to clean automatically on startup only (this is the only Setup Menu default that I changed).

The only way you can get dust on your low-pass filter is by changing lenses. If you pay attention to the user manual, you always turn off the power before changing lenses (to avoid shorting out the lens contacts and frying the camera circuitry). You then will take pictures after turning the power back on, so that's the logical time to clean the sensor -- on powering up the camera, after you've exposed it to the risk of dust, not before (i.e., at shutdown instead of startup).

I don't know what sensor cleaning can do to the life expectancy of the sensor, but it stands to reason that if you vibrate the thing twice as often, you're probably cutting its life expectancy in half. Cleaning both at shutdown and startup (the third choice) isn't going to make your sensor significantly cleaner, if at all, than just doing it at startup, and you're doubling the risk/halving the lifetime of the sensor by doing it both ways. Not much point in doing that, is there?

Playback Menu

Display Mode. I think it's important to see the Highlights page all the time, but not the other two choices available on this menu. The RGB Histograms really aren't necessary, beyond the Composite histogram you already get, unless you're shooting through an infrared filter (and therefore need to keep the Red from clipping, which you generally can't tell from the composite/average histogram in IR). The three extra data pages don't provide data that I'd normally want to see, that isn't already provided in the standard Overview screen. Activating all the data pages makes it more time-consuming to scroll through the playback menu to find the page you really want to see; my advice is to strip the display mode to the minimum that meets your own needs.

Shooting Menu

Under Set Picture Control I have a custom setting that I created and almost always use, called "Unadjusted," in which all the sliders are set at zero. The only “canned” picture controls I ever might use are Monochrome (if I want to check what my scene would look like as a monochrome) and Vivid (which I use exclusively for movies, which otherwise can look pretty flat). However I have created a few more custom settings, mainly various filtrations for monochrome that I might want to activate easily.

I set Image Quality set for NEF (RAW) only, unless I am shooting for a client who wants some JPG proofs in a hurry. If I want JPGs of specific NEFs immediately off the camera, I can create them in the Retouch menu where I can do some basic retouching to them before passing them to someone. I don't see the point of cluttering the flash card with a one-size-fits-all JPG duplicate of everything I shoot, except when working for a client.

I always set the Colour Space for Adobe RGB for NEF capture. If I’m shooting NEF + JPG, then I’ll use sRGB, planning to convert the NEFs back to Adobe RGB for editing. Adobe RGB has a

wider gamut than sRGB and is better for editing, but sRGB is probably your best choice for out-of-the-camera JPG proofs.

I set Long Exposure Noise Reduction to On. It doesn't activate until the shutter speed drops to 8 seconds. I don't often use a tripod, so I rarely use shutter speeds that slow. If I set this Off, there's a risk I'd forget to turn it on when it's needed. So I just leave it on all the time.

I turn OFF the High ISO Noise Reduction. There are better ways to do high-ISO NR than with an in-camera automatic setting (plug-ins like Nik Dfine 2, Noise Ninja, or the controls in both Nikon Capture NX2 and Adobe CameraRAW are generally better than the in-camera control). NR is something I want to control, not abdicate control to the camera. NR always involves a trade-off with image sharpness; I want to judge that trade-off on the monitor on a case-by-case basis, not default it to a fixed in-camera setting.

I use the Movie setting for 1280x720 quality; why not go for the best available?

Custom Settings Menu

a1 - AF-area mode – I set this for 3D tracking, which I think is a good all-around setting (it makes it easy to re-compose a shot after focusing on a subject of your choice, while keeping that subject in focus). However, a good alternative when taking candid photos of a child or grandchild might be to use the Auto-Area mode (this is the Nikon default for most of the exposure modes). In this mode, the camera automatically chooses the subject and focus area but gives priority to people, using Nikon's face-recognition algorithm. This works if the person is facing the camera and probably best if there is only one person in the frame, or if more than one they all are at the same distance, otherwise there is no guarantee the camera will choose the "right" face to focus on. This might also work well with AF-C mode, if the person (small child especially) is moving erratically. However, I think Auto-Area is a poor choice as a default for most P, S, A and M-mode settings, for most serious photographers. In Auto-Area mode, the camera decides what the subject of your photo will be and picks the focus point. Except when trying to capture a swiftly-moving child, and assuming that Nikon's face-recognition will work correctly, this isn't a very good idea, in my opinion, unless you are a point-and-shoot-only photographer (in which case it's unlikely you'd be reading this review). Most serious photographers who I know would rather choose their own subject and focus area, than have the camera make that decision for them.

> Face-priority focus in Live View shooting will at least indicate in red which face is being used for focusing, so if one wishes to rely on face-priority auto focus one arguably is better off doing so in Live View when more than one person is in the scene. The manual says that in Live View (presumably also in regular shooting with Auto-Area, though this is not clear) the camera can select from up to five faces in the scene. If there is more than one face, the camera will always focus on the face closest to the camera in Face Priority or probably Auto Area AF. When shooting a person in a scene where extraneous persons are in the foreground of the frame, one would best rely on AF-S and single-point focus with a stationary person or AF-C/AF-A dynamic-area focus with a mobile person.

a3 - turn the built-in AF- assist illuminator Off. Most of the time, the camera's auto-focus doesn't need this light. The light can be very distracting to other people; I don't want that light to be startling people without my knowing beforehand it will happen, so I'd only use this if I found the camera really needed it.

a6 - I prefer to use the AE-L/AF-L for MB-D80 button on the battery grip for Focus Point Selection.

b2 - set Easy exposure compensation On -- This is a nice feature, an easier way to set exposure compensation than the alternative. Curiously, this feature works in Live View but not in Movie mode.

b3 - I prefer the largest possible Center-Weighted area when using that mode, so I go with 10 mm.

b4 - Fine-Tune Optimal Exposure. Always check your camera with a grey card to see if it's recording 50% brightness at 50%. If it isn't, here's where you set permanent compensation. On my D90, I need -2/6 for matrix, -2/6 for center weighted and -4/6 for spot. Every camera's meter may be different in terms of pin-point accuracy; test yours and adjust this setting accordingly.

d1 Turn the damn Beep off; I hate hearing it, whether on my camera or on anyone else's. (I also hate cell phones and pagers.)

d2 I always have the viewfinder grid display On, to help level the camera.

d7 I always want to use the same file number sequence no matter what folder or card I'm using, so this goes On. Otherwise you risk having too many files with the same name, in different folders, which can cause unexpected problems if you copy files from these folders and put them into a common folder (e.g., for an audio-visual presentation).

e4 I generally prefer Auto Bracketing Set for AE only, but sometimes I use ADL bracketing. I don't use flash often, but when I do, I doubt I'd want to bracket both the flash and the main exposure (the default). I use auto-bracketing often for HDR (high dynamic range) sequences, and I never use flash for those.

e6 Bracketing order of under > MTR > over makes much more sense to me, especially for HDR shooting, when I always want to review the exposure sequence on playback to be sure that I got the correct histograms both for shadows and for highlights within the sequence.

f3 I usually assign the Assign FUNC Button to Spot metering on both my cameras. I generally use Matrix metering, but sometimes I want to see if it's going to get me into trouble before shooting. A quick press of the FUNC button lets me switch temporarily to Spot metering in order to check the range between highlights and shadows in the scene.

f4 - Assign AE-L/AF-L Button. I prefer to use AE lock (hold) for this setting. You do have to remember to press the button a second time to release the exposure reading after you're finished with it (though the AE lock releases as soon as the meter or the camera turns off, so you're unlikely to get into too much trouble with this setting). I find the Hold choice more convenient (and less stressful on the small muscles in my right hand) than having to hold the AE lock button down with my thumb constantly to keep the setting active, especially for more than one shot. The lock feature also frees my thumb, for example to change the AF area with the multi-selector or to operate the main command dial while retaining the exposure lock. I used the AE Lock Hold setting for years on the D70 and the D100, as well as on my D200, so this use of the button is second-nature for me.

My Menu choices for the D90

The selection and ordering of things to store in My Menu is very personal and idosyncratic. For whatever it's worth to the reader, I list below the settings (in order) that I find convenient to store in My Menu.

ISO Sensitivity auto control
White Balance
Battery info
Active D-Lighting
a1 AF Area Mode
a2 Center focus point
a3 Built-in AF illuminator
Set Picture Control (mainly for video or monochrome)
a7 Live view autofocus
f3 Assign FUNC button (normally for Spot Metering)
b3 Center weighted area
e4 Auto bracketing set I sometimes change this to ADL
a6 AE-L/AF-L for MB-D80
d10 exposure delay mode
d12 MB-D80 battery type if you are going to use AA batteries
e2 flash control for built-in flash (esp for switching between TTL and Commander mode)
e6 bracketing order (maybe)
Display mode (in case I want extra information pages on playback)

And, from the Retouch menu, I add the following to My Menu:

Black and white, so I can see after-the-fact how my shot might look in monochrome, in case I might want to re-compose

NEF (RAW) Processing, to give me a quick option to create a customized JPG copy of any NEF file on the flash card to give to someone.

Comments on specific D90 features that particularly interest me

As the subtitle suggests, below I only discuss D90 features that are of particular interest to me. These are features that are new since my D200; a few of them may already be familiar to D300 users.

Menu features common to some newer Nikon SLRs

Active D-Lighting (either at time of shooting or in the camera's Retouch menu) expands the camera's dynamic range somewhat, though not as much as HDR bracketing will in my tests. If you turn this setting on at any of the levels available (low, normal, high, extra high, and auto) and shoot in NEF format, in Nikon Capture NX2 you can change the setting after the fact. You can't change the setting later with a JPG capture, nor even if an NEF capture if you turned ADL Off.

AF-A or auto select autofocus mode, in which the camera decides whether the subject on which you focused is moving and accordingly selects either single-servo (not moving) or continuous-servo (moving) mode. In either case, the shutter will not fire until auto-focus confirmation is achieved

(unlike in AF-C or normal continuous-servo mode, in which the shutter fires whether or not autofocus confirmation is achieved)

3D tracking AF-area mode. If you combine 3D tracking with AF-S autofocus mode, the camera focuses only on the focus point (of the 11 available) you select. If you combine it with either AF-C or AF-A autofocus mode, you select the initial focus point. Once focus is achieved, if you change the composition by moving the camera while the original subject is still in the frame, 3D tracking selects a new focus point and keeps the focus locked on the original subject as long as you hold the shutter button half-way down, even if the subject moves within the original frame.

Retouch menu - lets you make certain adjustments to an image and save a JPG copy of the modifications to the flash card. These adjustments generally aren't as good as they would be in Photoshop or Nikon Capture NX2. However, if you want to provide a somewhat-edited JPG of selected NEF files for a client, friend or family member quickly, without needing access to a computer and without having to do NEF+JPG capture for every picture you take, this menu might be of some use.

Monochrome options with filters and toning. The Set Picture Control in the Shooting Menu lets you configure the camera to take monochrome photographs. In this configuration, the camera will give you a live preview in monochrome in Live View. If you are capturing in NEF format, you can always recover the original colour Nikon Capture NX2; if you are capturing in JPG, you lose that option when capturing monochrome. The monochrome options are quite sophisticated on the D90. You can simulate the effect of using a yellow, orange, red or green filter over the lens. You can simulate the effect of 8 different types of toning, with saturation options within each tone.

Playback zoom. In the RGB histogram playback page, you can zoom in on the image, and the four histograms (red, green, blue and composite) will automatically update to display the histogram only for the pixels in that portion of the image visible in the monitor.

There are also some enhancements to the display on playback and in the IPTC field capture. Among other things, the camera records on Shooting Data Page 1 whether you were using the VR (vibration reduction) if a VR lens was attached. Particularly valuable for debugging sophisticated flash photography, if you use the camera's built-in flash in Commander mode for iTTL flash with remote Nikon Speedlights, you will find that the same Shooting Data Page 1 will display for you all the flash settings you used, both with the built-in flash and with the remote flashes. No need to keep separate notes in a notebook!

Ergonomics and continuity with previous Nikon SLRs.

I think the control and menu layouts on the D90 are very sensible and intuitive. I had no difficulty getting used to the camera. Much of the design is already familiar to me from the D70 and the D200, and the changes and additions are sensible and easy to locate.

Like the D70 and D80 before it, the D90 is a smaller and lighter camera than its "big brother" (the D300). For some users, and specifically for me, the smaller size is a bit inconvenient when the camera is attached to certain lenses that I own. People who find the camera body a little smaller

than they might prefer would do well to buy the optional battery pack.[2] The battery pack holds two lithium-ion batteries, doubling the shooting time before the camera shuts down until the batteries are recharged. The alternate shutter release on the pack also makes portrait-format shooting more comfortable and more stable. The pack expands the camera size and heft sufficiently to meet the needs of anyone whose hands are too large comfortably to hold the camera on its own, or who feels better with a heftier camera.

> On the subject of weight: the D90 weighs roughly half as much as the D200 and D300; the D90 is 420 grams (without a battery or flash card); the D200 is 830 grams (without a battery or flash card), and the D300 is about the same weight as the D200. During a 3-4 week overseas trip when you're carrying your camera gear over your shoulder or on your back 10-12 hours every day, that weight difference can matter, especially if you're doing a lot of hiking or back-packing. Not to mention the "weight" on your bank balance when you purchase the camera.

I've seen some reviews that complain about allegedly flimsy design or operation for the cover to the flash-card chamber (on the side of the right-hand grip), but I don't have any problems with that cover. Maybe the other reviewers had defective models or hold the camera in their right hand a lot differently from me.

I do have one caution about the D90's construction. A friend at the photo club has a D90 which he had to replace four times because the accessory terminal on all four cameras broke loose and failed to function. If I understand correctly, my friend used all four samples in very cold weather to photograph birds, with the MC-DC2 remote cord attached to that accessory terminal. I suspect the problem was partially caused by attaching or detaching the cord in the cold. The terminal and the connection for the cord are metal; the camera body is high-impact plastic. Metal contracts when it becomes cold; plastic does not contract, or not as much as metal, and can become brittle in the cold. Probably as a result of different coefficients of contraction, the terminal may be much more susceptible to breaking loose under very cold conditions. (I used the same remote cord repeatedly with my D90 during the same period with no problem, but I only used it in a well-heated room. I did notice however that the cable fits rather snugly in the terminal and requires some pressure in attaching and removing it.)

> Attaching or removing accessory connections in cold weather is probably not a good idea with this or any other plastic-construction camera. If you want or need to use the accessory terminal in cold weather, it might be best to connect the accessory in a warm room, carefully place it in your camera bag, and leave it attached throughout your outdoor shooting, taking care not to jar the connection. Detach the accessory only indoors once the camera has warmed up. These precautions probably are not necessary with a metal-body camera such as the D200 or D300, where I suspect the accessory terminal and body would expand or contract roughly at the same rates during temperature extremes, thereby reducing the chances of the terminal breaking loose from the body. I don't know whether Nikon would agree with this explanation of the problem and the recommendation for avoiding it, but it makes sense to me.

This is the only instance where someone I know has encountered a problem that might not have occurred with one of Nikon's more-sturdily-constructed (and more expensive and heavy) SLRs. I

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[2] The D90 shares the same battery pack with the D80; if you're trading in a D80 on a D90 and already have the D80 battery pack, keep it and the second battery you got for it, as they'll both work with the D90, as will the D70/D80 AC adapter and the infrared remote release trigger for those two cameras.

used the plastic-bodied Nikon F80 and D70 cameras for years and never encountered any problems due their construction. Luckily for me, I hate taking photographs outdoors in bitter cold, and also I don't often use remote cords out of doors even in the summer. As a result, the sturdier construction of the D100 and D200 cameras that I've owned hasn't really made a difference to me, compared with the less-sturdily constructed models. People who are wedded to using cameras in very cold weather or other adverse environments might want to think carefully before committing to a plastic-construction camera, made by any manufacturer.

I used to get confused about how the Command and Sub-command dials work on Nikon SLRs. I finally figured out a simple way to remember this. (The following applies to all Nikon digital SLRs, as far as I know, and as long as you stick with the Nikon default setting for these dials.)

> Both dials work as follows in A, S and M exposure modes -- if you turn the dial ***to your left***, you would otherwise (if you weren't in an automatic exposure mode) ***increase*** the amount of light reaching the sensor, by
>
> > in S mode, decreasing the shutter speed (Command dial);
> >
> > in A mode, increasing the aperture/reducing the f: number (Sub-command dial, at the front of the camera, closest to the lens Aperture);
> >
> > in M mode, the two dials work the same as they do in S and A mode above.
> >
> > The "inactive" dial in S, A or M mode, if used with Easy Exposure Compensation (menu b2 set to On), will increase the exposure compensation.
> >
> > Of course, in S and A modes, these changes don't actually change the amount of light reaching the sensor, because as the shutter or aperture changes, the other setting adjusts in the other direction to preserve the same exposure. Only in M mode and in Easy Exposure Compensation are you actually changing (increasing, if moving a dial to the left) the exposure.
>
> In P exposure mode, turning the Command dial to your left doesn't actually change the exposure, but it simultaneously lowers the shutter speed and decreases the aperture (uses a higher f: number, for more depth of field). In P mode, the shutter adjusts in the same direction as it does in S mode, with the Command dial (the aperture, of necessity to preserve the same total exposure, works in the opposite direction).
>
> Unlike the D200 and D300, on the D90 there is no Auto Reset option in Easy Exposure Compensation (which would automatically reset exposure compensation to zero when the meter or camera turn off). On the D90, any exposure compensation you dial in with Easy Exposure Compensation remains set that way, even if you power the camera off and then back on. You must remember to reset the compensation to zero manually; the camera won't do that for you.

Live View

Live View shows the photographer on the LCD screen what the sensor is seeing (though not the depth of field, unless shooting at maximum lens aperture; depth of field preview is disabled in Live View). Using the optional remote cord and a tripod, one can monitor the frame and trigger the

shutter without ever touching the camera or peering into the viewfinder (which risks jarring the camera).

Auto-focus does work in Live View, but only in contrast-detect mode, which is quite sluggish. For a quick shutter response, one is probably better using manual pre-focus (Live View displays what is actually on the sensor, so manual focus in that mode is absolutely accurate) for stationary or very slowly-moving objects.

Live View performs curiously when you actually take a photograph in it. The mirror locks up when you enter LV, but when you take a photograph, the mirror drops back down, the camera takes a photo as it normally does (with the mirror going up and down), and then the mirror locks back up again. I don't understand why Nikon didn't just leave the mirror up all the time in LV, including during shooting. That would have provided the camera effectively with a mirror-up lock, important for slow-shutter-speed photography on a tripod, and the camera lacks that feature. The remote release does work in Live View, which would further have enabled vibration-free shooting in that mode. However, you can use the "exposure delay mode" in Custom Setting d10 to delay the shutter release about one second after the mirror pops up, which probably will avoid most camera-generated blur when using a tripod.

As a result of this complicated mirror action, there will be a "shutter lag" in Live View of about a second, even once the camera achieves auto-focus. However, for landscape photography and some macro photography (e.g., photographing a spider spinning a web, on a crawling insect on a flower) this Live View feature could be very useful.

Live View has a "face recognition" auto-focus feature. In my experience trying to photograph 18-month and five-year-old grandchildren and their parents in a relatively stationary pose on our living-room couch, I found this feature utterly lame and worse than useless. The focus wouldn't lock, or it took forever and I missed the shot I wanted. I quickly turned off Live View and returned to normal AF shooting through the viewfinder, which was responsive, quick and worked as expected. Nikon has a LONG way to go to improve their face recognition AF software, in my view anyway. While the D90 has many features to commend it to many users, its face recognition software is not one of them. Don't even think of buying this camera for the reason of that feature alone; if you do, you will probably return the camera to the store in frustration.

Info display on the LCD monitor

The D90's LCD screen is a nice increase in size over the D200's screen and a massive improvement over the D70 and D100 screens of yore. Better still, the D90 has a very helpful Info display that one can call up on the LCD screen at the press of a button. This detailed, well-lit display shows all current camera settings that are likely to matter to the photographer. In low light, or when the camera is elevated to eye-level on a tripod, this new feature is a god-send and a huge improvement over the viewfinder and control panel displays on all earlier Nikon SLRs I've owned. When the camera is elevated to eye-level on a tripod, the control-panel is almost impossible to see without standing on a step-ladder or removing the camera from the tripod. The Info display on the LCD screen shows more information than the control panel and is much easier to read, since all the icons are larger than on the control panel. The Info display also gives more useful battery-status information than does the control panel; when using the battery grip, the Info display shows the charge on both of the batteries in the grip.

Better still, a second press of the Info button activates a quick-adjustment menu at the bottom of the display, giving fast access to a number of useful settings that otherwise would require drilling into one of the camera menus to access. These settings include:

Noise Reduction (both long-exposure and high-ISO),
Active D-Lighting,
Picture Control,
the Func button,
and the AE-L/AF-L button.

Interestingly (and not really mentioned in the Manual), the Info View display for the location of the focus point responds "live" to presses on the multi-selector. If, after changing the AF area, you then press the Live View button, if you had set LV focus for Wide Area or Normal auto-focus (rather than Face Priority), the AF area in Live View will automatically correspond to whichever part of the frame you had previously selected in Info View. This is a quicker way of moving the AF area around the Live View window than using the multi-selector, which moves the AF area more precisely in very small (and time-consuming) increments.

The D90's new movie mode

The D90 was the first SLR in the world to have a movie capture mode, beating the only other SLR currently with that feature, the Canon 5D Mk II, onto the market by about three weeks. The Canon is a full-frame 21 megapixel camera that produces higher-resolution movies than the D90, but it also costs between two and three times as much money. Expect to see this feature in more-affordable Canon SLRs and probably more Nikon SLR models in the future.

For someone who only shoots video occasionally or uses it primarily to help document or annotate (with voice recording) a video memo to go with a series of still shots (e.g., on a trip), the D90 is probably all the video camera you'll likely want or need. It produces quite good videos. The resolution matches or excels that of most camcorders in its price range, and the CMOS chip is bigger than that of most camcorders. Paired with Nikon optics and superb low-light performance, the D90 can produce video images as sharp and clean, or better, than any amateur camcorder I've used (I rented a Sony hard-drive Handicam, similar to the SR-11, for a weekend, which is my basis for comparison).

I have a few tips for using the movie mode in the D90, based on several days of playing with the feature.

Your exposure is limited by ISO step adjustments from 200 to 3200 (a 5-stop range); the aperture cannot be changed once the movie is recording. So, if you are going to film in low light, start off using an f/2.8 or faster lens. Before beginning the movie, go into Aperture Priority Matrix mode and set the aperture at f/4 or wider (smaller f-number). At f/5.6 or more your movie will probably look dark, and exposure compensation probably won't fix the problem due to the 5-stop ISO range. Conversely, for outdoor filming, use any lens, but don't plan on opening the aperture more than f/5.6 or so, or the bright areas in the movie may be blown.

Since I can't edit photos afterwards, at least not with any software I own, movie recording is a good place to use Picture Control. Especially for "home movie" snapshot videos, I'd use the Vivid mode, otherwise the movie may look a bit flat. When shooting stills, I would avoid using that mode.

Comparison with camcorders

The D90's movie mode has several technical limitations that can be frustrating to a serious videographer, especially one familiar with comparably-priced camcorders.

First, there is no autofocus during video recording, so the operator must adjust focus manually. This inevitably looks choppy and amateurish in the resulting film clip. Also, the lens aperture can't be changed once recording begins. Exposure is adjusted automatically by the camera by varying the ISO, which limits you to a range of about 5 EV, as noted above. You can tweak exposure beyond that range sometimes using exposure compensation, but the control operation is clumsy and the microphone will likely pick up the sound of your fingers operating the controls! In contrast to the D90, autofocus and autofocus tracking are very good in most camcorders, and cancrders can vary the exposure by changing aperture as well as gain, which gives most camcorders a lot more exposure latitude in high-contrast situations than the D90 can muster.

Many camcorders use “steadicam” optical stabilization for hand-held filming. Nikon’s VR lenses are stable for still photographs, but VR is not really designed for video or movie filming. As a result, hand-held pans and zooms on the D90 look quite jittery on playback, even when using VR if you own a VR lens. Also, camcorders use an electronic motor to zoom their built-in lenses; manually zooming a Nikkor attached to the D90 results in further jitters in the appearance of the movie.

The D90 only records monaural sound, and the microphone doesn’t pick up sound well beyond a distance of perhaps ten feet. Most camcorders have sophisticated stereo, often surround-sound, microphones which have a zoom feature that can isolate sounds or voices from background noise at considerably more than ten feet from the camera. This difference is not surprising, when you notice that the D90 microphone consists of three pinholes in the front of the camera body. Camcorders have much more advanced microphones that are much less susceptible to sounds of the photographer’s fingers stroking controls on the camera body.

However, the D90 has some advantages over most comparably-priced camcorders. First, because of the large CMOS sensor, the D90's image quality and shadow noise are much better in low light and low-light. While many camcorders can record still images, these are JPG and not RAW images, and the D90's still images are much better than the still images from any camcorder I've seen. If you are primarily interested in still capture and only use video capture occasionally, the D90 is a better choice than a camcorder. The new movie feature means you don’t need to carry a dedicated camcorder around with you, as long as you aren’t hoping to produce a movie to submit to the Toronto Film Festival!

I own two compact digital cameras, both Panasonic Lumix models (the FZ8 and the LX3), which also have a movie mode. It is interesting to compare and contrast these with the D90's movie mode.

> The Panasonic Lumix FZ8's movie mode is inferior to the D90's. The resolution is about half that of the D90, and the FZ8's CCD chip can't handle low-light as well as the D90's CMOS chip.
>
> The Lumix LX3 however has a movie mode whose resolution and frame rate exactly match that of the D90, though the low-light performance isn't quite as good.
>
> Unlike with the D90, with the Lumix cameras you can't turn off the sound during movie recording, if you wish to do so.

The D90 records video clips in AVI format; most compact cameras record in MOV format. AVI is a Microsoft format and plays back in Windows Media Player; MOV is an Apple format and plays back in Quick Time.

With the Lumix cameras, focus, aperture and focal length are all locked at the onset of filming. With the D90, you can adjust the focus and focal length (on a zoom lens) manually during filming. However the lack of focus adjustment in a compact camera doesn't generally matter except with very long focal lengths. The true focal length of most compact-camera lenses is quite short, and hence they have plenty of depth of field to accommodate focus problems.

The Lumix image stabilization generally works more smoothly than Nikon's in-lens VR mechanism, at least partly because the Lumix is working with a vastly smaller and lighter lens. Also the Lumix only weighs 310 grams without the battery, therefore being easier to hold steady than the D90 with battery grip, two batteries, and the 18-200 VR lens, working out to 1180 grams for the camera and lens and probably another 200 grams for the batteries and grip, between three and four times the weight (and bulk) of either Lumix camera. That Nikon lens alone weighs nearly twice as much as either Lumix camera.

I can't hear any difference in sound quality between the D90's and Lumixs' movie clips. Sound is monaural on all three cameras, and the microphones on all three consist of pinholes in the front of the camera bodies.

The Lumix cameras can film continuously until the flash card fills; the D90 limits the length of its movie clips, to protect the camera circuitry. But if you are serious about capturing 30 minute video "clips," you probably want to use a good camcorder anyway.

When panning across a high-contrast scene, I find that the exposure adjustments during filming are smoother in the Lumix cameras than in the D90. The D90's ISO adjustments occur in discrete and quite visible steps, causing the image brightness to "pop" during playback. I rarely see that with the Lumix video clip.

In summary: movie capture on the D90 is better than on my Lumix cameras for keeping the shadow noise down in low light, and when I want to zoom the lens during filming. However, in other situations, either Lumix camera (and especially the LX3 which matches the D90's HD resolution) is as good a choice for video filming as the D90.

For me, the big advantage of the D90's movie mode is the option of recording a movie clip, with my own voice-over, to annotate or document a location before I begin shooting still images. In reviewing photos from overseas trips, I often have trouble remembering in which church or town I took a specific photo. During my shooting, I can annotate that information in a video clip, with voice-over, and the D90 will record the AVI file with the same name prefix and number sequence as it uses for the still images. This makes it very easy to find the video annotation that goes with a series of still images, when reviewing my photos at home in a file browser.

The D90's monochrome settings

The D90 is an ideal digital camera for monochrome shooters. The camera's Picture Control Monochrome setting lets you customize sharpness, contrast, brightness, filtration, and toning for your monochromes. The choices of filtration (similar to using a filter over the lens) include none, yellow, orange, red, and green. There are ten toning effects: B&W (no toning), sepia, cyanotype,

red, yellow, green, blue green, blue, purple blue, and red purple. Within each of the tones there are seven degrees of saturation to choose from. Using Custom picture control, a dedicated monochrome shooter can save up to 9 custom picture control sets, each one a different monochrome configuration, to make the choice of settings faster through the My Menu feature

Once you select a specific monochrome configuration, if you switch the camera to Live View you can see the scene live, through the lens, filtered by your particular configuration so you will see what you'll be getting before you take the photograph. This is better than trying to visualize what you'll get, and you can watch how the composition changes in monochrome as you move the camera position and watch the LCD monitor.

The monochrome picture control is compatible with Active D-Lighting, which can expand the dynamic range of the shot noticeably. NEF (RAW) photos taken in monochrome mode can be converted back to full-colour mode in Nikon Capture NX2, if you wish, so you aren't losing any real information by shooting this way. You can also take movie clips using your monochrome picutre control settings.

You can also create a monochrome JPG copy of a colour NEF or JPG file on the flash card using the monochrome feature in the retouch menu. However that feature is more limiting, giving you only the choice between B&W, Sepia, or Cyanotype, with no filtration, saturation, or brightness adjustments.

I compared the in-camera monochrome picture control with the in-camera monochrome retouch option, greyscale conversion in Photoshop using the Mode control, and more sophisticated software controls such as the BW Conversion filters in Nik Color Efex Pro 3 and Silver Efex Pro. I have concluded that the monochrome Picture Control isn't as good or as flexible as the Nik filters, but the Picture Control options are better than doing a simple greyscale mode conversion in Photoshop and generally better than using the D90's retouch menu feature. In my opinion, the best of all worlds for a monochrome shooter would be to use the D90 to shoot NEF (RAW) files in monochrome picture control, previewing in Live View, and then to convert the files back to colour in Capture NX2 for editing in Color Efex Pro 3 or for export to Photoshop for editing in Silver Efex Pro. If a client wants quick monochrome proofs, your best bet would be to set Picture Control for monochrome and set the camera for NEF + JPG image quality, which would give you both the raw and a JPG file automatically stored to the flash card; the JPG would be in monochrome but the NEF could be converted to colour later.

Infrared shooting with the D90

Occasionally, I like to take infrared photographs using either a Hoya or Singh-Ray infrared filter over the camera lens. It is not necessary to modify the camera to do this, although without modification the camera will require significant exposure times. To date, the best camera I've found for this kind of infrared shooting, in terms of relatively short exposure times, is the Nikon D70. I've used the D200 for infrared as well, and I have briefly tested my D90 against both cameras (see the illustrations that follow).

In my tests, D90 is about .7 EV more sensitive to IR (requires .7 EV less exposure) than is the D200, but about 4 EV less sensitive than D70. The D90 produces very fine IR images, better than either of the other cameras, in my judgment. The autofocus on the D90 works well in cloudy bright light through an IR filter. Due to the superior noise reduction and shadow range in the CMOS chip, the IR images have more punch and are better than one can get from the D200. In spite of its older chip and lower megapixel count, the D70 still compares quite well to both the other cameras in infrared.

The illustrations that follow were taken within a few minutes, on a tripod, using the same lens and infrared filter with each camera. I have cropped all three images for a side-by-side comparison. Bear in mind the D70 has only half the megapixel count of the D90, which affects the resolution of the D70 example. All three images were taken through a Hoya IR72 glass filter at ISO 800 and a lens aperture of f/8 on a sunny day in the early afternoon without any noticeable wind or breeze, focusing on the cedar hedge in my back yard. All three photographs were converted to monochrome using the same software settings.

Nikon D70, 1.6 sec exposure

Nikon D200, 30 sec exposure

Nikon D90, 20 sec exposure

On magnification side-by-side in Adobe Bridge CS3, the D90 example is the sharpest and the D200 surprisingly is the noisiest. The D70 and D90 have roughly the same shadow noise in these examples. Overall, the D90 is the winner, if one can live with the significantly longer shutter speed required compared with the D70. Certainly the D90 is a serious contender for infrared work.

Some comments on white balance with the D90

Some reviews have criticized recent Nikon SLRs, including the D90, for inadequate automatic white balance performance under incandescent lighting. In the Regeneration Hall of the Canadian War Museum, where the statues are illuminated mainly by incandescent lights, I compared the D90's Auto White Balance, Incandescent White Balance, and Pre-set Manual (manual white balance set using an Expodisc over the lens). On my colour-calibrated monitor, in a side-by-side comparison, I judge the Incandescent setting to be the most accurate (from my memory of these statues, which I have visited and photographed frequently in the past two years) and also the most pleasing to the eye. I would rate the Auto White Balance second, not as pleasing or as accurate, but still preferable to the supposedly (and probably scientifically) most-accurate Pre-set Manual taken using my Expodisc. While the Expodisc's white preset may be the most accurate, to my eye it lends a slightly

greenish or cyan cast to the statues. My eye noticed and remember the warm tones on those statues arising from the incandescent lighting in the ceiling of that hall, and the Incandescent White Balance setting (unadjusted) on the D90 more closely-matched that memory, not the "correct" white balance. My memory of the colour that my eyes saw suggests the “best” white balance would be about half-way between the Incandescent and Auto results shown below. All three exposures are 1/40 second, f/8 and ISO 1000, hand-held with a Sigma 18-50mm f/2.8 lens at a 26mm focal length.

D90 Pre-set Manual white balance

D90 unadjusted Incandescent white balance

D90 Auto white balance

I have found over the past three years that a similar result has obtained with my D200, namely that Auto White Balance or the appropriate in-camera "picture" white balance setting generally gives results more pleasing to my eyes and closer to my memory of what the camera saw, than does a manual pre-set white balance, even though I admit the latter is by definition the most "accurate" white balance from a scientific standpoint (when using the very-precisely-calibrated Expodisc to get the reading). I find with the D200, and will probably find with the D90, that making manual white balance settings is normally not a good use of my time “in the field.”

The D90's dynamic range

The D90 has an impressive dynamic range, by any criteria. I show my own noise and shadow-detail comparisons with the D200 and D300 later in this review, but it is instructive to examine the reports of dynamic range tests on the dpreview website for three Nikon SLR cameras of interest to me: the D90, D300 and D700.

Of these five cameras, the D300 has the most highlight range at any ISO between 100 and 6400. It also has the highest overall range of the five cameras from ISO 100 through 800. But what is striking is that the D90 has the highest reported dynamic range between ISO 1600 and 6400 (suggesting it is arguably the best low-light, high-ISO SLR of the three), and from the range ISO 200-6400 it has the second-highest highlight range and overall ranges (after the D300). Moreover, the D90's highlight and overall dynamic ranges generally only lag about 0.2-0.8 EV behind the D300, which isn't much. Most strikingly, the D90's dynamic range as reported in that website

consistently exceeds that of the much more expensive, full-frame-sensor D700 at all ISOs tested 100-6400!

For an $1100 camera, the D90's dynamic range is nothing short of astounding. From ISO 200 through 3200 the D90 range varies between 8.3 EV and 9.3 EV; at ISO 6400 the reported range is an amazing (albeit very noisy) 11.4 EV! To put this in context, most colour slide films had a dynamic range of 6 EV and negative films had a dynamic range of 10-11 EV. At most ISOs the D90's (and the D300's) range nearly matches that of negative film, and at ISO 6400 the D90 exceeds the dynamic range of negative film (and probably out-performs most ISO 3200 film pushed to 6400 in sharpness, contrast, and grain/noise as well as dynamic range). All three cameras have a greater dynamic range than any slide film I ever used.

Options for high-contrast shooting with the D90

Digital post-processing techniques, called tone mapping, can extend the dynamic range of a digital capture in high dynamic range (HDR) situations. Some techniques involve blending multiple exposure-bracketed frames into a single 32-bit file for tone mapping; other techniques work with single RAW exposures. I have used both techniques extensively with my D200 (especially in the Canadian Rockies), and I ran comparison tests between that camera, the D90, and a rental D300. In this section I will limit my discussion to the D90; see the final section of this review for the comparisons between the three cameras.

Multiple-exposure HDR with the D90.

Especially when shooting without a tripod, the ideal way to take a bracketed HDR sequence is to set the camera for its highest-speed continuous frame rate and use automatic exposure bracketing. On more expensive Nikon cameras, such as the D200 and D300, you can take a +4 to -4 sequence in 1-ev steps (this is called a 9F1.0 sequence, nine frames in steps of 1.0 ev). With the D90, you are limited to a 3F2.0 sequence, three frames in steps of 2.0 ev, giving a +2 to -2 sequence.

The D90 limitation of auto-exposure bracketing to +2EV to -2EV (using the 3F2.0 setting) is not a serious limitation for most HDR photography. The D90 has a dynamic range of at least 8.3 EV from ISO 200 upward (7.6 EV at Low 1 or ISO 100 and an astounding 9.3 EV at ISO 3200, according to the figures on the dpreview website). The 3F2.0 bracket effectively expands the camera's HDR range another 4 EV, boosting the total range to more than 12 EV. Two 3F2.0 bursts (take care to hold the camera in registration between the two bursts, or use a tripod), one shot with +2EV compensation and the other at -2EV compensation, produce six exposures (one of which is a duplicate at 0EV) that give a net +4 to -4 EV range, further boosting the effective dynamic range to 16 EV. Outdoor sunlight has a maximum contrast range of 17 EV (when shooting into the sun), but more normally (sun overhead, to the side, or behind the camera) does not exceed 8 EV unless very bright sunlit clouds or snow are included in the scene. The camera can cope with 8 EV easily in a single exposure, 12 EV in a single HDR burst and 16 EV in two overlapped HDR bursts, which will accommodate almost all outdoor scenes. Even excessive contrast indoors (sunlight beaming through a window into a darkened room) rarely exceeds 14 EV, which the camera can manage with two overlapped bursts. Night scenes with street lights, or small rooms lit with single incandescent lights, generally have a contrast range of 12 EV between the lights and the surrounding areas. (Contrast-range figures taken from The Complete Guide to High Dynamic Range Digital Photography by Ferrell McCollough)

As McCullough notes, the 3F2.0 AE bracket series (or 5F1.0 bracket series, on cameras like the D200 and D300, which don't allow bracketing in increments greater than 1.0 EV) is the "workhorse"

of HDR shooting and can handle most HDR needs, either on its own or in two overlapped 2EV-compensated series. Given the choice, 3F2.0 is arguably preferable to 5F1.0 (which gives the same dynamic range), because the use of fewer frames generally results in less ghosting and greater sharpness in the HDR blend (though more frames in smaller exposure increments may result in somewhat less noise in the HDR blend). If anything, the D90 is arguably a better camera for HDR shooting than either the D200 or the D300. Evidence to support this statement will be presented in the comparison section at the end of this review.

My advice for multiple-exposure HDR photography with the D90 is as follows.

Set auto-exposure bracketing (AEB) for 3F2.0, at all times. Always use AEB for HDR, even when the camera is on a tripod, to avoid jarring the camera out of alignment when making manual exposure adjustments.

Shoot using Continuous shooting mode at the High rate. Images shot closer together in time are less likely to result in HDR ghosting than are images shot further apart.

Aperture-priority Matrix metering arguably is the best exposure mode for HDR. Set the aperture to f/8 outdoors (to avoid exposures beyond the range of the camera) or f/1.4-2.8 indoors (to avoid high ISOs and excessive shadow noise). Another option is to use Manual metering; the D90 varies only the shutter speed in AE bracketing in Manual mode. Never use Shutter-priority or Program exposure modes for HDR, as they will vary the aperture (and hence depth of field) between frames, which will likely cause serious ghosting in the HDR blend. A and M modes vary the shutter speed in AE bracketing, which won't normally introduce any more ghosting in moving foliage or water than is going to occur anyway due to motion that occurs between exposures. In scenes where nothing is moving, A and M modes will never introduce ghosting, but S and P modes almost always will.

Use a tripod, or if, unable or unwilling to use a tripod, take care to concentrate on holding one of the auto-focus brackets in the viewfinder steady on a specific object in the frame throughout the HDR shooting sequence. If possible when not using a tripod, brace your elbows on something solid. When using a tripod, use the optional cable release or the optional infrared remote trigger to trip the shutter.

McCullough would recommend turning Auto ISO (in the Shooting Menu) off, but I leave it On in hand-held HDR shooting to ensure the shutter speeds don't drop so low as to cause camera-shake issues in some exposures

Arguably use manual focus. However, I find I can get away using auto-focus, with no serious danger of significant auto-focus shift during the exposure set, if I use AF-S or AF-A mode with Custom Menu a1 set for Single Point and a2 set for Normal central-focus zone, or AF-S mode with a1 set for 3D tracking.

Set the ISO for 200 (at ISO 100 the D90 loses 2/3 EV in dynamic range, not worth the very minimal improvement in noise that lower ISO setting might bring relative to 200)

If you are using a Nikon VR or Sigma OS lens, turn the image stabilization On if you aren't using a tripod

Do not use Auto White Balance, use an appropriate fixed-temperature white balance setting instead, to ensure the white balance doesn't shift between exposures

Ideally shoot only NEF (RAW) files; you can do HDR with JPGs, but the results won't be as satisfactory.

In my field tests (see below) I found that I got the best HDR mergers if I turned Active D-Lighting Off.

Turn High ISO Noise Reduction Off, unless you know that all your exposures will be taken at ISO 800 or higher (which means that NR will be applied to all the exposures and not just to some of them; on the D90 High ISO NR only activates at ISO 800 or higher). Noise reduction always reduces image sharpness to some extent, and in my opinion a little extra noise in some exposures used in the HDR sequence would be preferable to variations in sharpness across the sequence. The HDR blending of multiple exposures always smooths (averages) out noise relative among the images in the sequence, so the noise in an HDR blend will always be less than it was in the noisiest of the single frames that make up that blend.

After taking the series, always play back the sequence on the LCD screen and check the histogram for the +2 and -2 EV shots to ensure there is no shadow clipping in the +2 shot and no highlight clipping in the -2 shot (there usualy will be highlight clipping in the +2 shot and shadow clipping in the -2 shot; this is to be expected, otherwise you wouldn't need HDR for the scene). If there is such clipping in either or both shots, you will need to take extra exposures using larger exposure compensation.

Don't forget that HDR can be used in panorama sequences, and that HDR can be very effective for sunset or sunrise photography.

Ghosting is inevitable in an HDR blend if the scene includes moving water or foliage, or sometimes clouds, affected by wind or breeze. Also, ghosting may result from birds, animals, people, vehicles, windmill blades, etc. that moved in the scene during the AEB sequence. There are four ways to deal with ghosting in HDR:

> try using the ghost-removal feature in your HDR software, if it has that feature;
>
> try cloning away the problem in Photoshop;
>
> try blending the single 0EV image from the AEB sequence with the HDR blend, using a layer mask on the single image placed as a separate layer on top of the HDR file in Photoshop; or
>
> if all else fails, try tone mapping a single image from the set (see above). The resulting image may not have the depth and "punch" that a tone-mapped HDR blend would have, but it won't having ghosting.

HDR works very well with black-and-white photography. A black-and-white transformation of a colour HDR image can reduce the visibility or impact of haloing, chromatic-aberration, and colour-noise problems; noise in a B&W transformation will look very much like film grain and may add to, rather than detract from, the appearance of the image. Also the tone-reversal problems that excessive tone mapping can create are usually less visible or objectionable in monochrome. Some HDR software can produce monochrome images, or you can probably get more satisfactory results by processing the colour tone-mapped image through the excellent Nik Silver Efex Pro plug-in or other sophisticated conversion tools.

If you don't like the result of your HDR blend of an AEB sequence, you can always select one image from the AEB series and try to process it through single-exposure HDR (see more detailed discussion in the next section). This is always best with an NEF image. With the NEF file, do as much pre-processing as possible of the highlights, shadows, and noise in Adobe CameraRAW or Nikon Capture before exporting the file to TIF for single-exposure HDR processing. However, two Photoshop plug-ins I've tried, Nik Dfine 2 and Noise Ninja, both do better noise reduction than either Adobe CameraRAW or Nikon Capture. If you own either of those noise-reduction plug-ins, use them on the file before applying the HDR processing, and adjust only the shadows and highlights in your RAW processor.

Findings from my HDR tests at Regeneration Hall, Canadian War Museum, Ottawa.

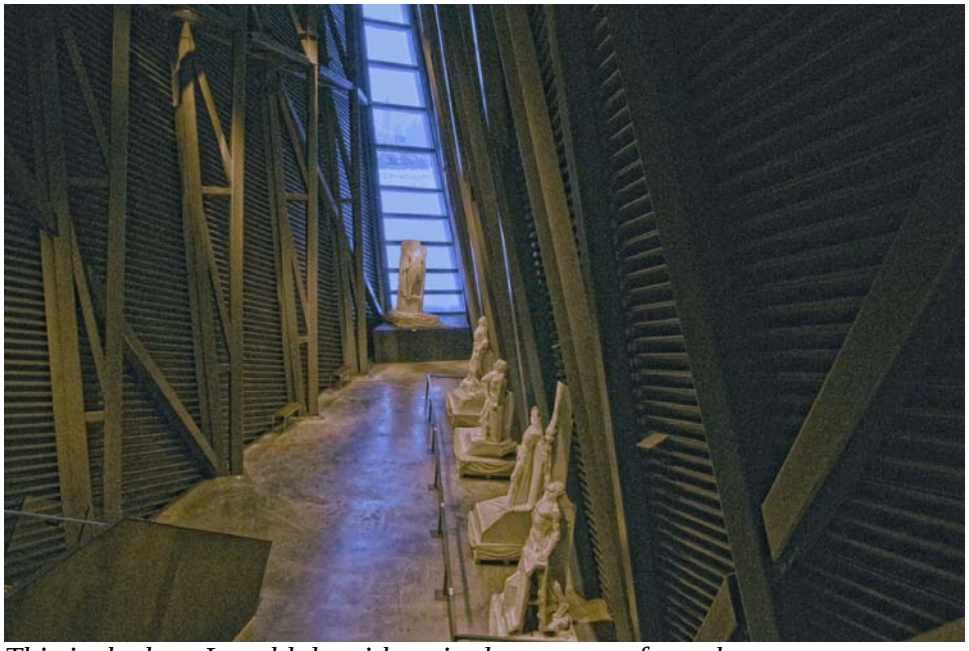
My favourite venue in Ottawa for conducting HDR tests is Regeneration Hall in the Canadian War Museum in Ottawa. Photography is allowed there, as long as your camera bag isn't so large as to cause concern with the security guards (I think they mainly are worried about damage to some of the exhibits if you are careless in carrying the bag). According to my incident metering of light from the exterior window and in the deeper shadows in that hall, the contrast range is roughly 11 EV on a sunny day (there is some artificial lighting in the hall which mitigates the contrast with the window light). In theory, a single 3F2.0 sequence on the D90 should accommodate this range, but it is even better in my experience to created a 5F2.0 series with two overlapped 3F2.0 sequences. This results in much less noise and better images than the single 3F2 series. A 5F2.0 sequence is created by taking two 3F2.0 sequences, one at +2 exposure compensation and one at -2 exposure compensation. Before blending the images in your HDR software, deleted one of the two 0-exposure-compensated photographs that you took.

In terms of camera settings for HDR shooting in this venue, I find that matrix metering gives better results than spot metering off the window light. To hold detail in the contrasty exterior lighting, it is best in this case to set the aperture for f/8 rather than f/2.8.

I find that I get better results with an HDR sequence on the D90 if I turn Active D-Lighting (ADL) Off before taking the sequence. In cases where I think I might need to use only a single exposure from the set, due to image ghosting, I might consider taking the sequence with ADL set to Auto. Since I always shoot in NEF (RAW) quality and almost always process the NEF images in Nikon Capture NX2, with any ADL setting in-camera I can later adjust the ADL setting, or turn it off entirely, in that software. I would then save the results in 16-bit TIF format for further processing in Photomatrix Pro software.

Below I present one of the 5F2.0 sequences that I took in this venue on the D90, adjusted with additional edits using Nik Color Efex Pro 3's Tonal Contrast and Brilliance/Warmth filters. Note the difference between the 5F2.0 sequence and the edit of one image selected from that sequence.

Nikon D90 5F2.0 HDR sequence processed in Photomatrix Pro software.



This is the best I could do with a single exposure from the same sequence used to produce the preceding 5F2.0 HDR sequence; this is the -2 EV exposure from that +4-to–4 ev sequence. Notice the significant increase in shadow noise and the very flat appearance of the Parliament buildings through the window. The HDR processing makes a significant difference to the quality of the final image.

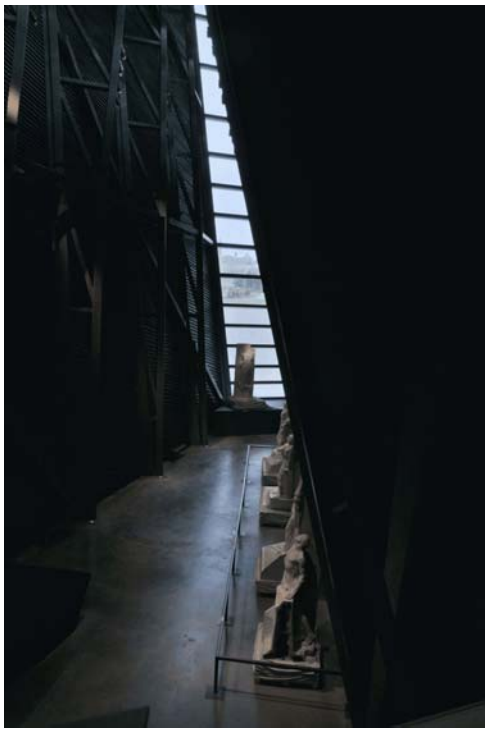
Single-frame options for HDR work with the D90

Bracketed multiple exposures aren't always feasible in high-contrast situations. The technique won't work with subjects that can move between exposures, such as animals, birds, people, vehicles, or even flowers or grasses that are blowing about in the wind. Also, the machine-gun-like sound of the camera during the rapid-fire exposure burst may be too distracting to other people. In such cases, you have to live with an single exposure. There are still some ways to expand the dynamic range of that one exposure. The D90 has an interesting contrast-range-expansion feature in the camera (Active D-Lighting); NEF shooters who process their RAW files in Nikon Capture NX2 have several software options to enhance the dynamic range of an image (D-Lighting in the Adjust>Light menu; the shadow and highlight protection controls in the Quick Fix part of the Edit List's Develop section; and, if Active D-Lighting was set in-camera when the photo was taken, options to adjust that setting appear under the Edit List's Develop>Camera Settings section).

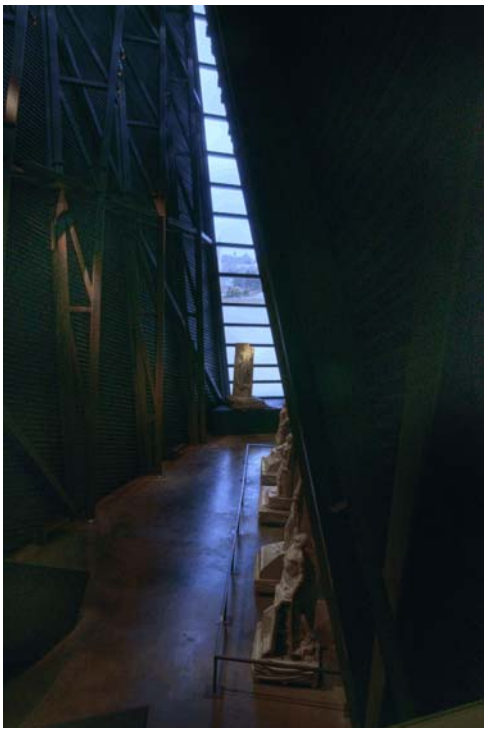
The D90 has two D-Lighting features: Active D-Lighting (ADL), which affects the photograph at the time of exposure, and D-Lighting in the retouch menu, which generates a Large Fine JPG from a RAW file or, if the photo was shot in JPG mode, at the same quality and size settings as were used for the original JPG. The camera's Active D-Lighting control gives you the choice of Low, Normal, High, Extra High, and Auto. Auto in my tests seems to give the same result, or very close to it, as Normal. The Retouch menu D-lighting feature only gives you the choices of Low, Normal, and High. Active D-Lighting both brightens shadows and dims highlights, bringing back detail in both. D-Lighting in the Retouch menu only brightens the shadows; it does not affect the highlights. In Capture NX2, the two D-Lighting options both affect both shadows and highlights. The D90's Retouch Menu option is much less tempting than the others, in my opinion, since it doesn't affect highlights.

Owners of either Photomatrix Pro software or the Photomatrix Tone Mapping plug-in for Photoshop (both available from www.hdrsoft.com) also have the further option of doing "pseudo-HDR" tone-mapping processing of a single exposure. This, and all the preceding options that I've mentioned, generally work better for me than the Shadow/Highlights adjustment control in Photoshop versions CS and later and the Black and Recovery sliders in Adobe CameraRAW CS3 and later.

I tested all the non-Adobe options with NEF photographs taken in Regeneration Hall, from the same camera position I used for my HDR-sequence tests. I present below a few of the test results, followed by a summary of my conclusions from these tests.

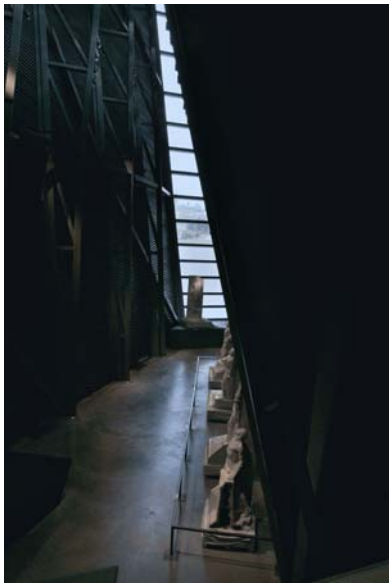


Sample A. D90 in-camera ADL turned off; highlight & shadow adjustments in NX2 Quick Fix menu

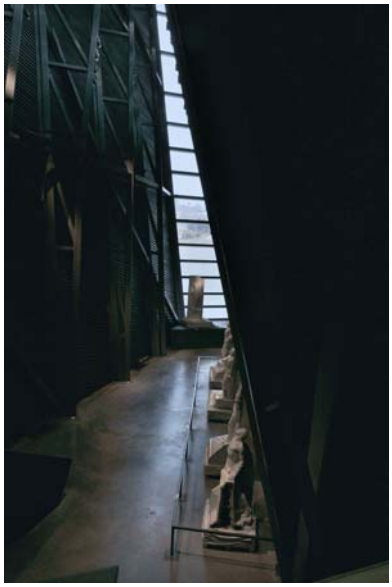


Sample A processed with PhotoMatrix Tone-mapping plug-in (Photoshop CS3)

Sample B. D90 in-camera ADL set for Auto; no software adjustments



Sample B, with shadow protection adjustment in NX2 Quick Fix menu



Sample B, ADL re-set for Extra High in NX2 & shadow protection adj. in Quick Fix

Sample C. D90 in-camera ADL set for Extra High; no software adjustments

Sample C, with shadow-protection adjustment in NX2 Quick Fix menu.

In summary, I found the following works best for single-frame HDR work. (None of the single-frame results were as satisfactory as a 5F2.0 bracket sequence processed in Photomatrix Pro software.)

The best results were using Active D-Lighting in-camera, set at Extra High, coupled with further Highlight and Shadow adjustments in Quick Fix in Capture NX2.

I can see no difference between shooting the photograph at one Active D-Lighting setting and later adjusting that setting to a different setting in Capture NX2, and shooting at the latter Active D-Lighting setting in the first instance. For this reason, it makes sense to me to leave the D90's Active D-Lighting set permanently at Auto when shooting NEFs, unless I am certain I will be using auto-exposure bracketing for HDR (which works best without any ADL applied in-camera). The Auto setting in the file gives me access to the Active D-Lighting adjustment in Capture NX2, where I can change it to one of the other settings or turn it off after-the-fact, at will.

In Capture NX2, D-Lighting (under the Adjust>Light menu) and Shadow/Highlight adjustments in Quick Fix can be done in addition to the Active D-Lighting adjustments in-camera or in Capture NX2's Develop>Camera Settings menu. However these multiple boosts can result in a substantial increase in shadow noise, so they need to be used judiciously.

Comparisons between the Nikon D90, D200 and D300 SLRs

Other reviewers generally compare the D90 to comparably-priced cameras made by Nikon's competitors. For me, a Nikon user with many Nikon-mount lenses, that isn't relevant. What is relevant is a comparison with Nikon alternatives to the D90 that I might consider.

At the time I bought the D90, my principle SLR was my Nikon D200 (with my trusty D70 as a backup). I wanted to know what were the relative merits, and demerits, of the two cameras, to help me decide which would be my principle camera, which my backup, and when I might prefer to use the backup instead of the principle camera. So I did my standard head-to-head comparisons of the D200 and D90, using the same lenses.

I was also curious to discover what, if anything, I'd missed by getting the D90 instead of the somewhat older, pricier D300 which has much in common with the D90, especially the same pixel-count. In particular, I was curious whether the D300's 14-bit-depth option (it also shoots NEF in 12-bit depth) was worth the price difference relative to the D90, which "only" captures in 12-bit depth. So I splurged $150 plus tax for a weekend rental of a D300 body, and compared it head-to-head with my D90, using the same lenses and targets.

To cut to the chase, and spoil my ending: I think the D90 is a better camera than both the D200 and the D300. The price of the camera does not form any part of that assessment, though the D90 is much less expensive than both those cameras were when they first entered the market.

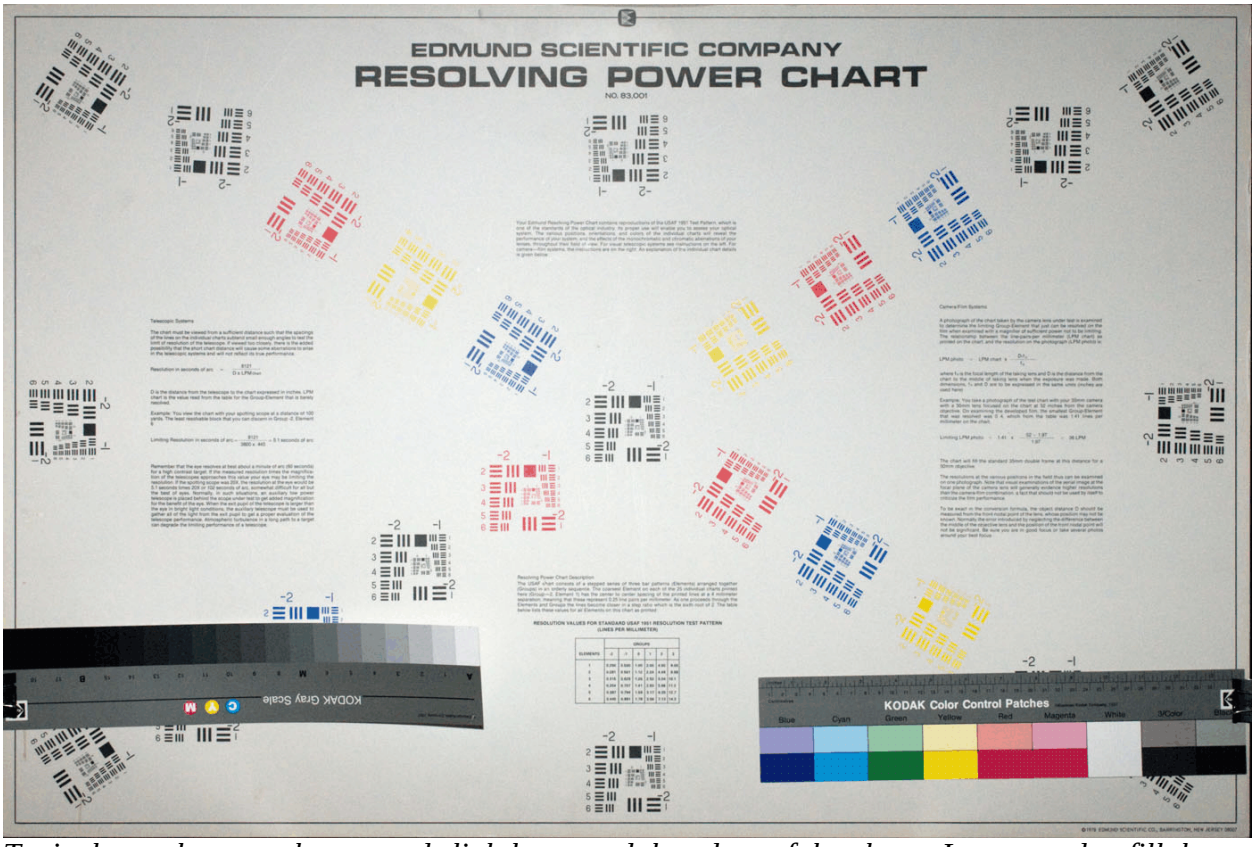
"Pixel-peeping": resolution and noise

I compared all three SLRs using my standard resolution and noise tests. To do this, I use an Edmund Scientific Company Lens Resolving Power chart, to which I attach a Kodak Grey Scale. The chart shows me the resolution of the cameras; the Kodak scale shows me the shadow range and, on close examination of the grey patches, the noise.

To do these tests, I use the same lens, focal length and lens aperture for all three cameras (for this review, I used my Sigma 50mm f/1.4 lens with the aperture set at f/8). The cameras are placed on a tripod at the appropriate distance from the test chart. Each camera uses the same Nikon Speedlight SB800 (attached to the hot shoe) for standard illumination. Each camera is set for manual matrix metering with TTL flash metering (shutter speed set at 1/125 second); the in-camera sharpening and high-ISO noise reduction controls are turned off. I systematically vary the ISO setting on the camera; taking NEF (RAW) exposures at each ISO, using a remote cord to fire the shutter and using auto-focus. For each ISO setting tested on each camera, I took three exposures; I later examined each triplet at high magnification in Adobe Bridge and selected the sharpest exposure for further analysis (to guard against contamination of the tests by occasional auto-focus errors). With the D300, I repeated the tests both at 12-bit and 14-bit depth, to see whether the bit depth affected resolution and noise (it didn't affect either in my tests, as it turned out). I also compared the D300's compressed and uncompressed RAW options, since the D90 only records compressed RAW (I could see no difference between the D300's compressed or uncompressed RAW filtes).

The test images are processed minimally in Photoshop; the only adjustment to the images is a Levels adjustment to tighten the shadow and highlight sliders to the edge of the histogram (if necessary), and to use the mid-tone eyedropper to standardize the white balance to neutralize the area immediately above the central test area on the chart. (This is necessary because, at higher ISOs, the

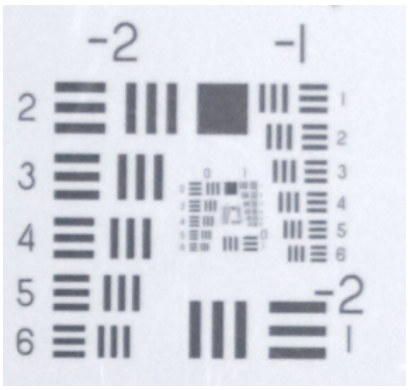
tungsten illumination in my kitchen competes with the flash illumination and introduces an orange cast to the photograph.) I then examine the central test pattern, and the lower end of the grey scale, at high magnification in Adobe Bridge CS3, comparing the equivalent exposures from all three cameras side-by-side. The following photograph shows the test-chart setup, uncropped.



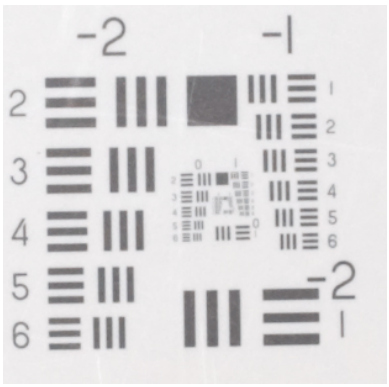
Typical test photograph, cropped slightly around the edges of the chart. I attempted to fill the viewfinder with the test chart, but as the cameras do not display 100% of the photograph in the viewfinder, there inevitably was some extraneous space around the chart edge. The comparisons that follow involve the central test pattern and the left-hand half of the Kodak Grey Scale in the lower-left corner of this image.

Resolution results

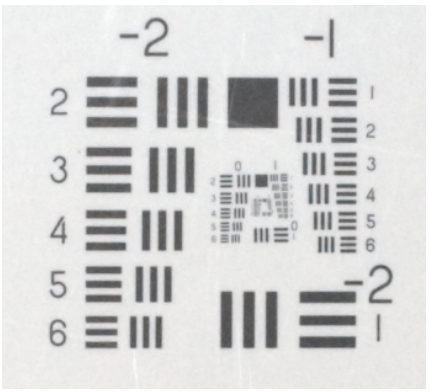
There is no difference between the various ISO levels tested; in every case, the D90 and D300 displayed the same resolution, while the D200 displayed somewhat less resolution. No surprise; the D90 and D300 are both 12-megapixel cameras, while the D200 is a 10-megapixel camera. There is no visible improvement in the D300's resolution when increasing the bit-depth to 14 bits; the other two cameras “only” capture at 12-bit depth. (I do not bother to show these results, to save space).



D200, ISO 200



D90, ISO 200



D300, ISO 200

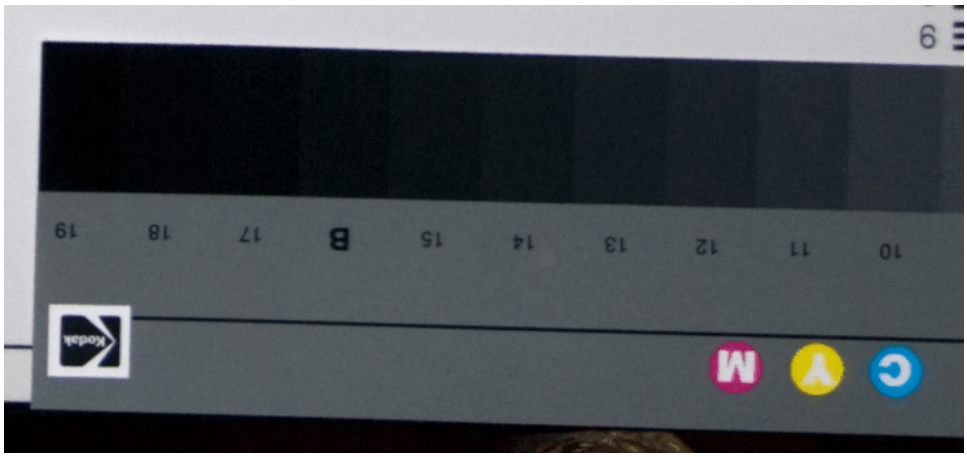
Noise and shadow range

These tests are surprising. In them, even at ISO 200, the D90 shows less noise and better shadow definition than the more expensive D300, not to mention the D200. The superiority of the D90 in noise and shadow definition is especially striking at ISO 3200. For brevity, I omit showing the intermediate ISO results, which confirm the D90's superior performance in these tests. Bear in mind that no noise-reduction was performed on these tests, either in-camera or later.

Because of the space required, I show each set of three test results on separate pages. The Kodak Grey Scale's patches are in increments of 0.3 EV; notice that at ISO 3200, the D90 is able to discriminate the boundaries between adjacent patches 1.7 EV darker than the D300! There is no question in my mind, from these tests (which I confirmed in HDR field tests in the Canadian War Museum) that the D90 is superior to the D300 (and also the D200) for low-light, high-ISO photography. At low ISOs, it matches or slightly exceeds the D300.

Note how much more noise the D200 produces at ISO 3200 than either the D90 or the D300. The D200 uses a CCD chip; the other two cameras use CMOS chips. These examples illustrate why CMOS is the technology preferred by photographers who like working in low light or with high ISOs.

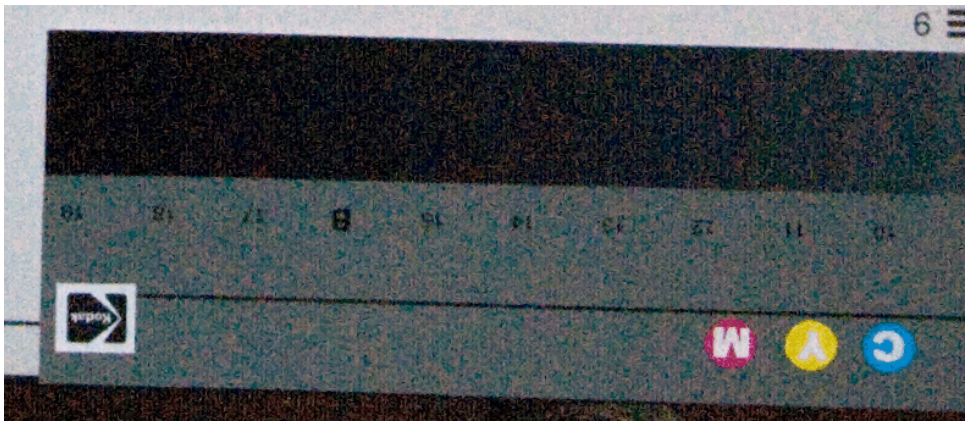
Noise and shadow definition at ISO 200



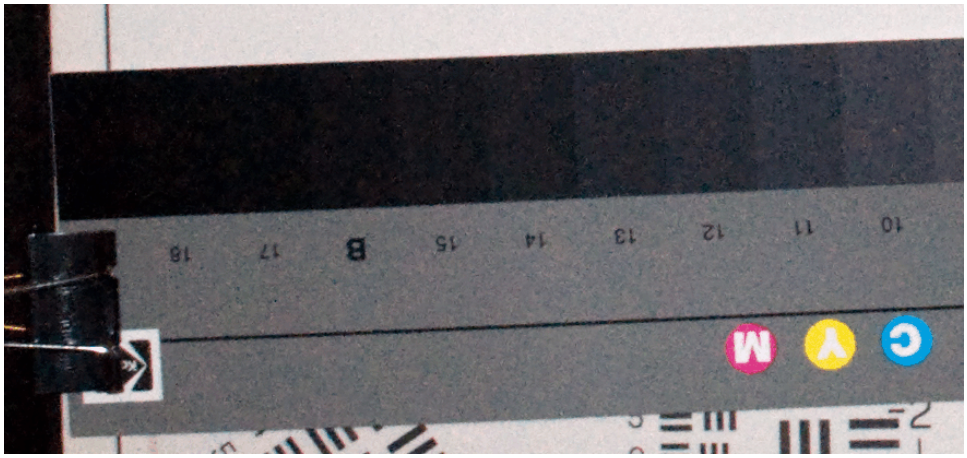
D200

D90

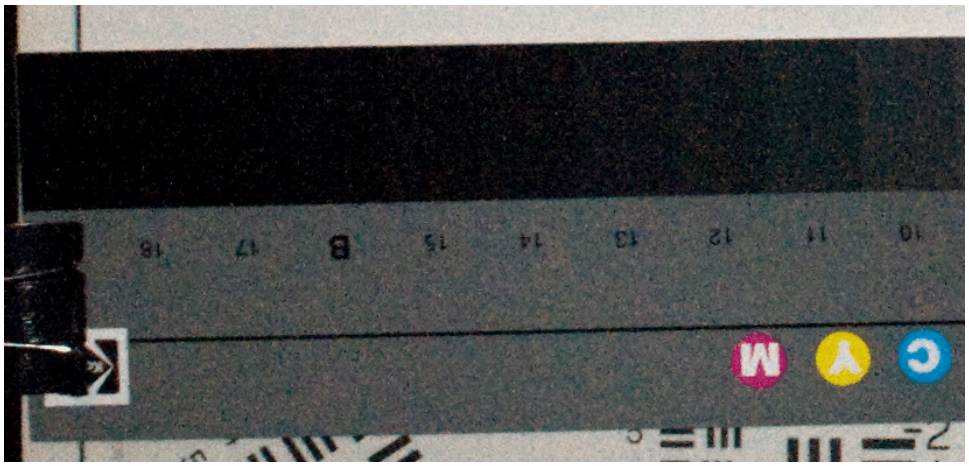
D300



D200



D90



D300

There is much more to photography than “pixel-peeping,” of course. On separate occasions, I took my D90 and D200, and then my D90 and the rental D300, to the Canadian War Museum for some “field tests.” I also used both my D90 and D200 during a three-hour photo session during a dress rehearsal of Thirteen Strings in St. Andrew’s Presbyterian Church in Ottawa. During these three outings, as well as during my handling of the cameras in my “pixel-peeping” tests, I formed some opinions about the comparative operating characteristics and practical performance of these cameras. I conclude my review by sharing these opinions, giving a few illustrations along the way.

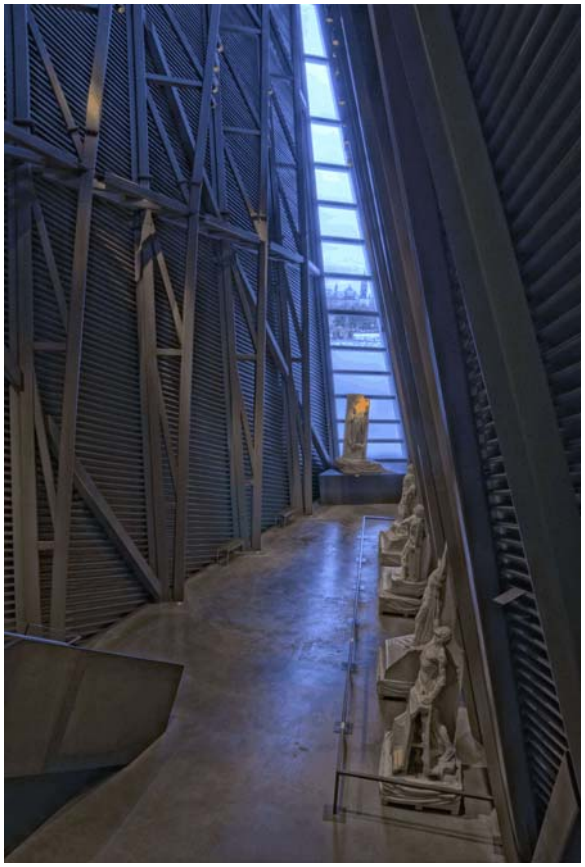
Comparison between D90 and D200

As does the D300, both cameras use the same batteries. However, the D90 uses SD and SDHC cards, rather than the CF cards used by the D200 and D300. With a few exceptions noted in my discussion of the D300 below, the control layouts are similar enough that experienced users of one model should have little trouble shifting to one of the other models. All three cameras have the same great Nikon i-TTL Commander-mode remote flash capability using the cameras’ built-in flash units.

There are two situations in which I would prefer to use my D200 instead of my D90.

> Unlike the D90, the D200 has a mirror lock-up feature. When the camera is on a tripod, camera vibration caused by the mirror operation can still cause some image blur at shutter speeds generally between 1/15 second and about 8 seconds, depending on the focal length in use. By locking up the mirror, you can wait a few seconds for the vibration of the mirror to end, before tripping the shutter. One would use a remote cord to trip the shutter. Both cameras also have a shutter-delay feature that delays the shutter about one second after the mirror pops up. This delay can partially alleviate the vibration problem, but at the cost of precise control over shutter release timing for "decisive moment" photography. With mirror lock-up, however, one can watch the subject (not through the viewfinder, of course) and trigger the shutter precisely using the remote cord.
>
> With hand-held HDR auto-exposure bracketing, it may be preferable in some situations to capture a +4 to -4 EV sequence in a single burst. This can be done on the D200 using the 9F1.0 bracket setting in 5-fps continuous-fire mode; with the D90, one would have to take two overlapped 3F2.0 sequences, adjusting exposure compensation between them. This inevitably results in some camera movement, which can cause alignment problems in the HDR software, and takes longer to execute, which can result in extra ghosting in situations where any significant subject matter in the frame is in motion (including water, clouds, or vegetation, not to mention animals, birds, people and vehicles). A 3F2.0 sequence on the D90 can take less time to execute than the 9F1.0 sequence on the D200, but one gets only a +2 to -2 range instead of +4 to -4. Also, although the D90 produces less shadow noise than the D200, in HDR shooting, blending nine frames instead of three will result in much smoother shadow detail (less noise is visible). See the two illustrations immediately following this paragraph.
>
> In this particular location, I also took some 5F2.0 sequences on the D90 (two overlapped 3F2.0 sequences). This was made easy by the ample balcony ledge on which I could rest my elbows to help keep the camera aligned properly during the exposure-compensation adjustment; that would not always be possible, for example, on a hike in the mountains. While the 5F2.0 sequence from the D90 looks better than the 9F1.0 sequence shown

below, the 3F2.0 sequence is inferior to the 9F1.0 sequence, both in terms of noise but also in its larger dynamic range.



D200, 9F1.0 HDR sequence processed in Photomatrix Pro software

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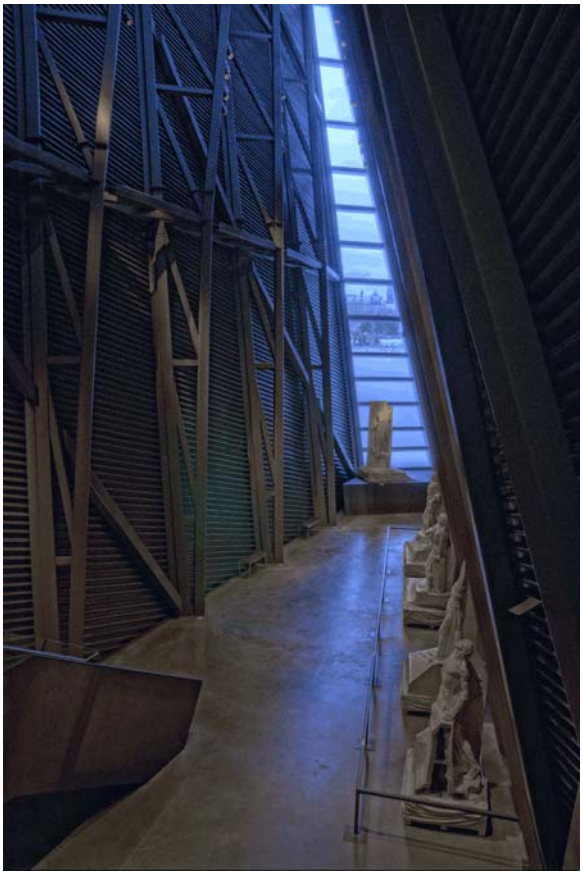

D90, 3F2.0 HDR sequence processed in Photomatrix Pro software.

In most other situations, however, my D90 would be my camera of choice, with the D200 serving only as a backup. Some of the reasons for this opinion are:

As illustrated earlier, the D90 has better shadow detail, more dynamic range, and less noise than the D200, in single exposures. The D90 also benefits from the Active D-Lighting feature which permits in-camera expansion of the dynamic range, when it's needed. That feature is also available on the D300, but not on the D200.

The D90 has much better options than the D200 for taking scenes in monochrome. The D90's Live View feature (also on the D300 but not on the D200) permits previewing the scene in monochrome, with options, something that is not possible on the D200.

The D90 takes movie clips; the D200 doesn't (nor does the D300).

The AF-A and 3D-Tracking auto-focus features on the D90 (discussed above) are very useful; neither is available on the D200.

Finally, and significantly when one is carrying photo gear for long periods of time, the D90 is a signifcantly smaller and lighter camera.

I conclude my comparison of the D200 and the D90 by presenting an example of very similar photographs taken during the Thirteen Strings dress rehearsal that I photographed. Both photos were taken as NEFs and were processed identically in Photoshop CS3. Each image was opened in Adobe CameraRAW, in which I adjusted the Recovery and Black sliders to recover clipped highlight and shadow detail as much as possible. Both images were then processed for noise reduction using Nik Dfine 2's automatic setting. Both images were straightened and keystone-corrected using Andromeda Lensdoc. The dynamic range was expanded using the PhotoMatrix Tone Mapping plug-in, with identical settings in both cases. Nik Color Efex Pro 3 was used twice; first the White Neutralizer filter was applied to one musician's white shirt, to correct the auto white balance that the camera used. Then I applied the Tonal Contrast filter, using the default settings and adjusting the shadow and highlight protection sliders appropriately. Finally, both images were resized to the same pixel dimensions, sharpened using Nik Sharpener Pro 3's Display default settings, and saved as JPGs at the same compression ratio. While the D90 final image is less noisy than the D200's when examined under high magnification, the difference is not noticeable at normal viewing distance or magnification. I find both versions quite pleasing and would be hard-pressed to choose between them. Certainly the D200 remains a perfectly acceptable tool in my kit, though I suspect the D90 will likely get more use most of the time.

D200 with Sigma 30mm f/1.4 lens, 1/50 second f/3.5 ISO 1600.

D90 with Sigma 50mm f/1.4 lens, 1/100 second f/4 ISO 2200.

Comparison between the D90 and the D300

Before presenting a few illustrations from my field tests, I will discuss my impressions of the specifications and handling of the two cameras. After spending a weekend using both cameras, I am convinced that, at least for my purposes and tastes, the D90 is much preferable to the D300. That conclusion may surprise or upset some people, especially those who rushed to purchase the D300 when it first hit the market (and was selling at roughly double the price at which the D90 sold when it hit the market). I did not arrive at this conclusion capriciously or lightly.

I begin my discussion with a couple of observations about camera ergonomics. Then I discuss five features that may matter to some photographers, maybe even to me sometimes, for which the D300 is superior to the D90. Next I discuss eleven features that may matter to some photographers, especially to me, for which I think the D90 is superior to the D300. I conclude

with a discussion of six features that the D300 has and the D90 doesn't, features that should make a difference but in fact probably don't, in my opinion. Just doing a feature-count from this discussion, weighting each feature equally (and I recognize that not everyone would agree with that), I think the D90 wins the comparison.

Camera Ergonomics.

Someone familiar with the D200 and the D90, not to mention earlier Nikon SLRs, will have little trouble figuring out the D300's controls and menus, with two notable exceptions.

> On the D300 Live View control is hidden in the Mode Dial at the top of the camera; on the D90 there is a very-conveniently-located and much-easier-to-find Live View button on the back of the camera.
>
> Though my D100, D70, D200 and D90 all had/have a dedicated Bracket button (as did my F80 film camera), for reasons that I cannot fathom, on the D300 Nikon buried the Bracket control in the operation of the Func button, which is both inconvenient and non-intuitive, especially to a long-time Nikon owner.

Though the D300 can fire at an impressive 7-8 fps in Continous-High servo mode at 12-bit depth, switch the camera to 14-bit depth and the CH servo is slower than molasses in January, maybe 1.5 fps, probably due to the extra processing for the 14 bit depth. This, for me, defeats the purpose of CH servo in 14-bit depth, especially as I use it mainly for multi-frame AE bracketing for HDR compositing. While in the 1-2 seconds needed to complete a 7- or 9-frame bracket burst in CH mode at 12 bits is sufficient to avoid serious camera-registration or subject-motion issues at least in landscape photography, the several seconds needed to complete these bursts in 14-bit depth isn't at all helpful and may make a sharp, well-registered HDR composite much harder to achieve, especially without the use of a tripod. However, not to worry – as I mentioned earlier, the 14-bit depth on the D300 seems utterly pointless anyway. I can't see any differences in my test photos with the rental D300, between 14-bit and 12-bit versions, even at 400% magnification on my monitor.

The larger size of the D300 means it is more comfortably in my hands without a battery grip, than is the D90 without a battery grip.

Five features where the D300 is better than the D90.

The D300's construction is more rugged and weather-tight. This isn't a major concern for me, but those who do a lot of shooting in very cold, wet or dirty environments might find this a plus.

Like the D200, the D300 gives the user options of setting the centre for centre-weighted metering as either a 13mm circle and using the full-frame, options not available on the D90. As someone who would rather do full-frame average metering than centre-weighted averaging (because I really don't know what the relative weights are nor how that affects the metering in many situations), that is a plus.

As with the D200, the D300 gives you the option of auto-exposure bracketing up to nine frames in one-EV increments, which as discussed earlier can be an advantage in some HDR shooting. The D90 limits you to three frames in up to two-EV increments.

Like the D200, the D300 has a mirror-up shooting mode, very useful for eliminating camera vibration even on a tripod, with shutter speeds in a certain range.

The D300 gives you up to 8 frames per second of continuous shooting, versus 4.5 fps on the D90. This could be a plus for serious action or sport photographers, of which I am not one.

Eleven features where the D90 is better than the D300.

In spite of, and even at 14-bit depth, the D300 doesn't have as much dynamic range and as good high-ISO, low-light peformance as the D90 (see my tests above).

The D90 has 3D Tracking Auto-Focus mode; the D300 doesn't. I discuss this feature earlier in this review.

Though I don't often use Picture Control, a feature on both the D90 and the D300, Nikon added a lot more parameters to the D90's Picture Control menu than what it gave to the D300.

The D90 has 10 sharpness adjustments instead of 7 on the D300;

7 contrast adjustments instead of 5;

7 saturation adjustments instead of 5;

a new Quick-Adjust feature on all Picture Control choices, that automatically adjusts all settings in the given mode by +2 to -2 in one-step increments;

new Landscape and Portrait modes in the Picture Control menu (though Nikon now lets you download these from their website and install them on your D300, a belated attempt to upgrade the D300's PC menu partially);

nine custom sets that you can create by tweaking the other Picture Controls (the D300 gives you exactly zero custom sets).

The D90 has a new Extra High setting for Active D-Lighting, which is very useful in high-contrast scenes; also an Auto setting which often gives intermediate values, can be over-ridden or reset easily in Capture NX2 afterwards. The D300 doesn't have either of these settings.

The D90 has a couple of Live View enhancements beyond the D300's Live View features:

face-priority auto-focus in Live View, which may be of interest to some, though I can't get it to work fast enough for my taste;

you can move the AF sensor in Live View anywhere on the screen; no longer are you limited to specific AF-sensor positions (51 on the D300).

auto-focus is possible both in hand-held and in tripod mode while the Live View is active; in the D300 it is possible only in tripod mode. On the D300, in hand-held work with Live View, auto-focus only happens after the mirror drops back down, shutting off the Live View and risking loss of framing since you're essentially blind and not on a tripod. In my view, this was a really stupid design flaw in the D300; it would have made

more sense to have AF in hand-held mode and not in tripod mode, where you're much more likely to be using manual focus in Live View than auto-focus anyway.

New to the D90 is the Info View option for the LCD screen. As I mentioned earlier, this is a very nice feature, especially when you have the camera on a tripod at eye-level in dim light. I think that this feature more than offsets the D300's somewhat larger control panel; in dim light the LCD Info View is vastly easier to read, as the icons displayed can be and are much larger than on the control panel.

The D90's new Movie recording feature, a first for Nikon SLRs, is potentially very useful. I discuss it earlier in this document.

The D90 is 205 grams lighter than D300 and takes a bit less space in your camera bag. This is a plus for travel photographers who carry their equipment all day for several weeks.

The D90 has several helpful improvements in controls and control layout, compared with D300, in addition to the D300's puzzling and unfortunate lack of a dedicated bracket button:

> On the D90, you use centre-press on the multifunction button on the camera back as OK, instead of having a dedicated OK button on D300. This makes more sense to me and frees up a button space for Bracket instead of OK.
>
> The My Menu feature is more useable and encompasses more settings than on the D300; for example, you can access the battery meter this way on the D90 but not on the D300.
>
> The D300's use of separate buttons to raise the flash and to adjust flash settings is a needless departure from the single-button approach on the D90 and also on the D200 and D100.

As with D70 and D80, the D90's built-in infra-red (IR) sensor and affordable optional IR remote trigger makes it very convenient to use the camera for self-portraits or to position the photographer with a group for a photo; none of the higher-end Nikons have had this option as affordably and conveniently, which has always surprised me.

Price. Enough said.

<u>Six D300 features the D90 doesn't have that should matter in theory but don't in reality, IMO</u>.

The ability to capture images at 14-bit depth. If I can’t see a difference from 12-bit capture at 400% magnification (and I can’t), why should this be of any interest to me? In theory, higher bit-depth should produce better dynamic range, sharpness and noise at high ISOs compared with the D90's 12-bit capture. It doesn't; in fact, the D90 has more dynamic range and less noise than the D300, as I show above. It isn’t just me who’s noticed this; in their comprehensive review of the D300, the Dpreview website did one direct comparison of 12-bit and 14-bit depth in their D300 review, under "RAW headroom" where in theory the bit depth should matter, but reported they couldn't see any difference between the two modes. Nor can I.

The D300's Custom Settings Menu and Shooting Menu Banks (four each) may be useful to some photographers, but my experience with the same feature in the D200 is this is nice-to-have but not worth a price difference. I rarely use this feature on the D200, and with the D90 I can just as easily use My Menu to modify key settings and keep track of what I've changed.

The D300's interval timer shooting feature may be of interest to some photographers, D200 has that feature but I've never used it yet in nearly three years of owning that camera. If you do lots of time-lapse photography, this may be of interest.

Ah yes, the number of auto-focus points. The D300 has 51 AF points, versus 11 on the D90 (and the D200). Frankly this is a negative in my view -- 51 points give me too many choices to make. I've found 11 auto-focus points is plenty for me. For years I somehow coped with cameras that only had five, and before that they all had just one. What a silly numbers game to get into!

The D300's 1005-pixel Matrix meter (vs the D90's 420-pixel meter) theoretically should provide more accurate metering and white balance, but I don't see it in my head-to-head comparisons with the D90 (see discussion below, with a couple of examples). In the majority of (relatively few) field tests where the metering and white balance differed between the two cameras (using the same subject matter, camera position, lighting and lens), I actually preferred the D90 result to the D300 result.

The D300 has AF fine-tuning to correct back- or front-focus problems with specific lenses, and the D90 doesn't (nor did the D200; I believe the D300 was the first Nikon with this feature). I really don't understand the excitement over this feature. In the past 30 years of using SLR lenses, back- and front-focus this has almost never been an issue for me. My very first zoom lens, a cheap Vivitar 80-200 back in the '70s, could never focus sharply at infinity, and that's the only lens I've ever owned where I noticed a focusing problem. I traded in the lens as soon as I noticed the problem - after the warranty period, unfortunately. I think this AF fine-tuning feature is just one more thing to fiddle and fuss with and is much over-rated; if your lens is so out of focus, take it back for a warranty repair or exchange if you can.

<u>A few field tests at the Canadian War Museum, over a rental weekend.</u>

I took my D90 and the rental D300 to the Le Breton Gallery at the War Museum in Ottawa. This is the warehouse-like space in which are housed a variety of vehicles, tanks, and artillery pieces dating from colonial days through the very recent past. I also used both cameras to photograph the statues in Regeneration Hall, which is adjacent to the Gallery. My objective was to see how both cameras would perform under the settings I normally use for most of my shooting: aperture-priority matrix metering, auto-focus, auto white balance, and auto-ISO. On both cameras I used my Sigma 30mm f/1.4 lens, generally either at f/4 or f/8. Auto ISO was constrained to a maximum of ISO 3200 and a shutter-speed limit of 1/40 second, the slowest speed at which I can usually get a sharp hand-held image with that lens. I set Active D-Lighting to Auto for the D90 and Normal for the D300 (which has no Auto setting; on the D90 Auto generally seems to give a Normal result in most situations). In-camera sharpening and noise reduction were turned off in both cameras, and all other settings were standardized between the cameras as much as possible.

In my tests I was particularly interested in the performance of the metering systems and the auto white balance. I shot 15 paired comparisons over a range of subjects and lighting (mixed incandescent and window light). In 7 comparisons, I judged the D90's white balance/colour rendering to be more accurate than that of the D300. In two cases, I felt the D300's metering was slightly more accurate. In the remaining 6 cases I thought the two cameras produced identical images. In all cases, in spite of the difference in the lower number of pixels used in the Matrix meter, the D90 produced colour fidelity equal to or better than the D300 in these tests. That's convincing enough for me. In every pair, the photographs were taken within a minute or so of each other, only as much time as it took me to switch the lens between the camera bodies. The

camera positions and lighting were identical within each pair, as of course was the lens and focal length.

I show two paired comparisons below, one in Regeneration Hall (statues) and one in Le Breton Gallery (close-up of a Soviet T-34 tank). I can't see a difference in the statue comparison (in both cases, 1/40 second, f/4 and ISO 250). There is a definite difference in the colour of the T-34 tank, with the D90 yielding an olive-green hue and the D300 a more brown-toned hue (in both cases, 1/40 second, f/8, but ISO 1250 from the D90 meter and ISO 900 from the D300 meter; both exposures were adjusted in Photoshop to the same brightness level). The D90's hue is definitely more accurate in that comparison; after viewing the results on my monitor, I re-visited the T-34 at the same time of day and confirmed that, to my eyes, the olive-green tone in the D90 photo is the more accurate of the two. The T-34-detail comparison provided the most striking contrast between the two cameras, of the 15 pairs I examined.

D90 example

D300 example

D90 example

D300 example

At Regeneration Hall, I did a number of HDR-sequence comparisons with the D90 and the D300. Below I show the best D90 3F2.0 sequence, the best D90 5F2.0 sequence (two overlapped 3F2 sequences with +2 and -2 EV exposure compensation), and the best D300 9F1.0 sequence (equal in exposure range to the 5F2.0 sequence from the D90). All sequences were processed in Photomatrix Pro software. The noisiest result was the D90's 3F2.0 sequence; the smoothest result, and the most pleasing overall in my judgment, was the D90's 5F2.0 sequence. I reproduce all three examples below. Banding in the window in all three shots was introduced by the word-processing software and does not appear in the JPGs that I imported below.

D90, 3F2.0 HDR sequence

D300 9F1.0 HDR sequence

D90, 5F2.0 HDR sequence. Highlight clipping on the rear statue introduced by WordPerfect, not in the JPG.

Conclusion.

Over the years, Nikon has developed a curious habit of issuing an "enthusiast" camera about a year after each of its 100-series camera. Each “enthusiast” camera had some notable improvements over its more expensive "older brother." The D70 was an improvement over the D100, as was the D80 over the D200. Now the D90 maintains this improvement pattern relative to the D300. Even the F80 had some new features that were major improvements over the more-expensive big-brother F90 back in film days; for example, if I remember correctly, the F80 was the first film SLR by Nikon to incorporate built-in on-demand gridlines in the viewfinder and an on-board auto-exposure bracket button, features that on the F90 required the purchase of expensive optional pieces of equipment, such as a special focusing screen and a "data" back for the camera.

This habit of issuing a more friendly, upgraded camera a year or so after the release of a top-line camera is a curious practice, to say the least. Now that I have noticed this, it encourages long-time Nikon owners like me to ignore new "big brother" models when they come out and wait a year for the "little brother" model with all the important features of the earlier model, a number of design and bug fixes, and a lower price tag. I'm not complaining, just making the observation.

I suspect that when Nikon introduces its replacement for the D300, I will probably ignore that camera and wait to see what the D90 replacement will look like, about a year later. Even if at that time I decide to keep my D90 and finally to replace my D200, leap-frogging between the “enthusiast” and “older brother” upgrades, after a year on the market, the D300 replacement probably will have dropped about $500 in price since its initial release (as happened to the D300 once the D90 was released).

The moral of the story: think twice before racing to pay top dollar for the newest "big brother" Nikon model as soon as it hits the stores. When the D100 first came out, it sold for about $3600 Canadian; when I bought it after it had been around for nearly 18 months, I paid only $2000 for mine, new off the shelf at a local camera store. You can see similar pricing patterns in the history of the D200 and D300. *Caveat emptor*.